To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

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M62437FP

Sound Controller With SRS Focus & SRS Surround

REJ03F0216-0201
Rev.2.01
Mar 31, 2008

Description

This is an IC for car audio.

F(•)cus system can realize more optimal speaker position.

Features

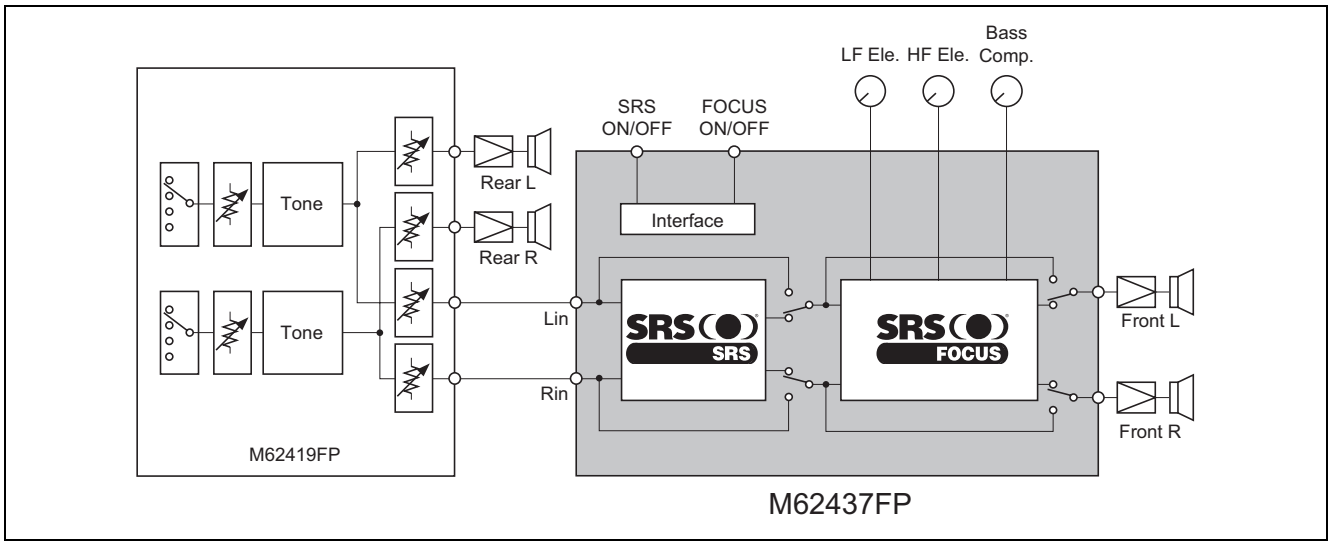
- Built-in F(•)cus [LF/HF elevation (position) and Bass Compensation can be changed by the external resistors.]
- Built-in SR
- SRS ON/OFF mode and FOCUS ON/OFF mode can be controlled by the DC voltage.

Recommended Operating Condition

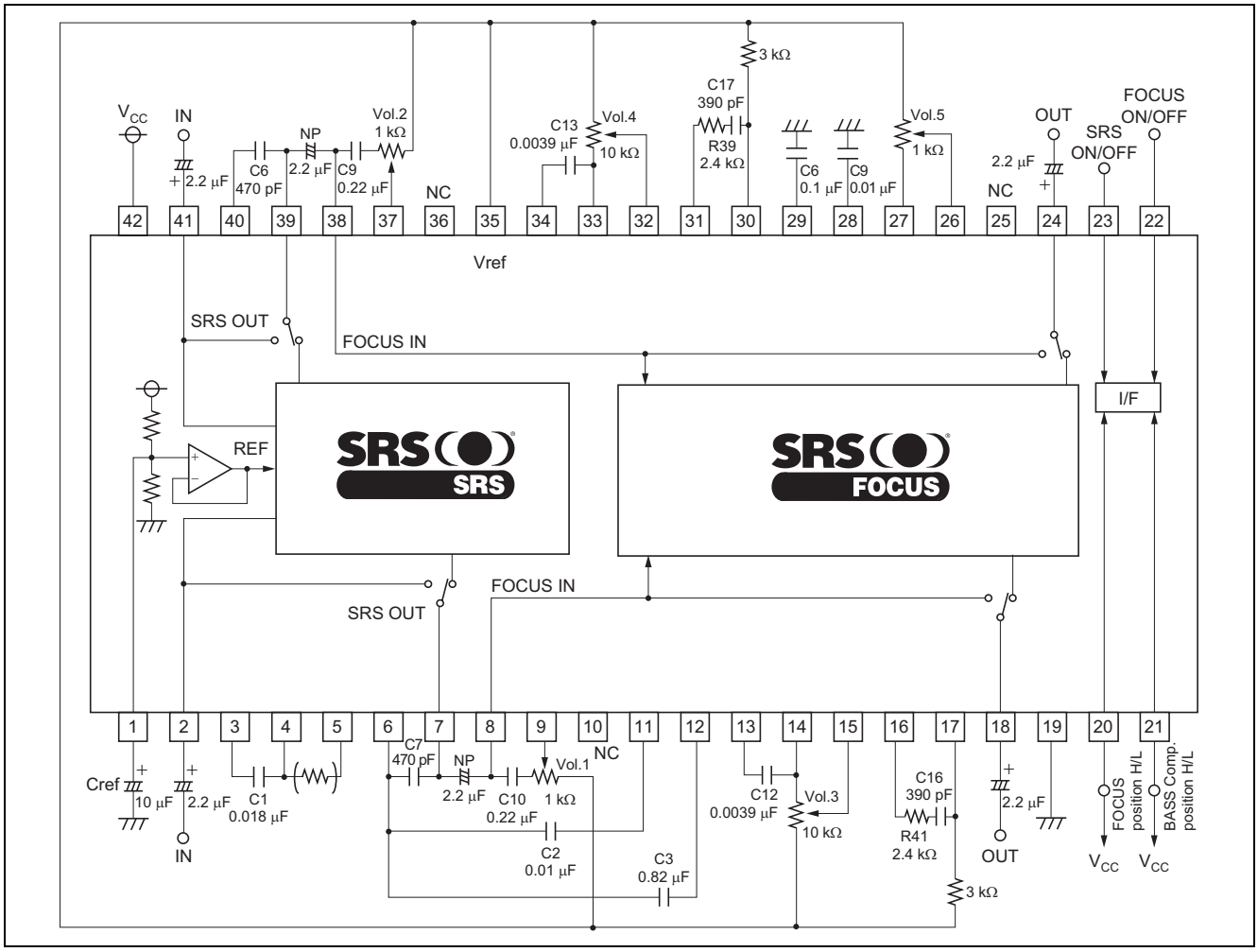
Supply voltage range: V_{CC} = 7 to 9 V

Rated supply voltage: V_{CC} = 8 V

System Block Diagram



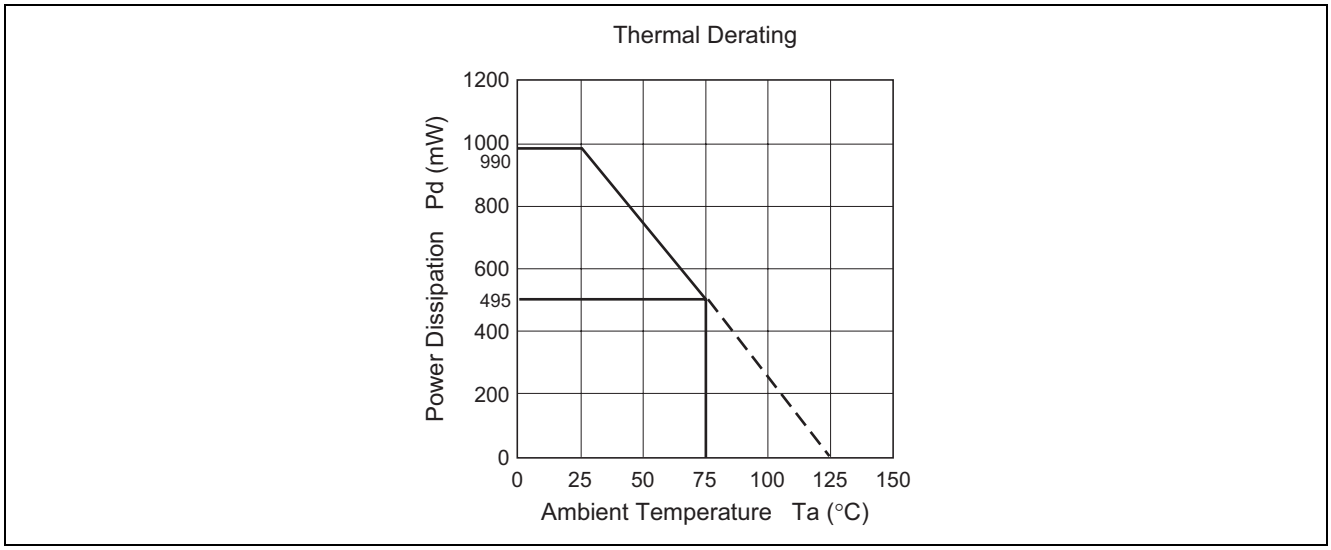
Block Diagram & Application Example



Absolute Maximum Ratings

(Ta = 25°C, unless otherwise noted)

Item	Symbol	Ratings	Unit	Condition
Supply Voltage	V_{CC}, Vdd	12	V	
Power Dissipation	Pd	990	mW	Ta ≤ 25°C
Thermal Derating	Kθ	9.9	mW/°C	Ta > 25°C
Operating Temperature	Topr	−20 to +75	°C	
Storage Temperature	Tstg	−55 to +125	°C	



Electrical Characteristics

(1) Power supply characteristics

($Ta = 25°C$, $V_{CC} = 8.0V$, $f = 1kHz$)

Item	Symbol	Limits			Unit	Conditions
		Min	Typ	Max		
Circuit current	I_{CC}	—	25	45	mA	42pin I_{CC} No Signal

(2) Input/Output characteristics

($Ta = 25°C$, $V_{CC} = 8.0V$, $f = 1kHz$, VOL.1, 2 = 1kΩ (VOL), VOL.3, 4 = 10kΩ (VOL), VOL.5 = 1kΩ (VOL))

Item	Symbol	Limits			Unit	Conditions	
		Min	Typ	Max			
Maximum output voltage	VOMt	1.6	1.9	—	Vrms	Input; pin2, 41 Output; pin18, 24 RL = 10kΩ, THD = 1%	
Maximum input voltage	VIM1	0.4	0.6	—	Vrms	Input; pin2, 41 Output; pin18, 24 SRS→ON, FOCUS→OFF THD = 1%	f = 150Hz
	VIM2	0.2	0.3	—		Input; pin2, 41/Output; pin18, 24 SRS→ON FOCUS→ON (All VOL. = max) THD = 1%	f = 1kHz
	VIM3	0.06	0.11	—			f = 20kHz
Pass gain	Gvt	–2.0	0	2.0	dB	Vi = 100mVrms SRS, Focus→OFF Input; pin2, 41/Output; pin18, 24	
	Gv1	7	10	13		Vi = 100mVrms Input; pin2, 41/Output ; pin18, 24 SRS→ON, FOCUS→OFF	f = 150Hz
	Gv2	15	18	21		Vi = 100mVrms SRS→ON FOCUS→ON (All VOL. = max) (2pin, 41pin)–(18, 24Pin)	f = 1kHz
	Gv3	25	28	31			f = 20kHz
Output noise voltage	Vno1	—	5.5	15	μVrms	Rg = 0 (2, 41pin) SRS→OFF, FOCUS→OFF DIN-AUDIO filter	
	Vno2	—	18	50		Rg = 0 (2, 41pin) SRS→ON, FOCUS→OFF DIN-AUDIO filter	
	Vno3	—	90	150		Rg = 0 (2, 41pin), SRS→ON, FOCUS→ON (All VOL. = max) DIN-AUDIO filter	
Channel separation	CT	—	–90	–75	dB	Input side: f = 1kHz, Vi = 0.5Vrms Monitor side: Rg = 0, IHF-A filter Focus: OFF, SRS: OFF RL = 10kΩ	

(3) DC Control Characteristic of the Switch Block

Item	Symbol	Limits			Unit	Conditions
		Min	Typ	Max		
"H" level input voltage	V_{IH}	2.1	~	V_{CC}	V	Pin 22, 23
"L" level input voltage	V_{IL}	0	~	0.8	V	Pin 22, 23

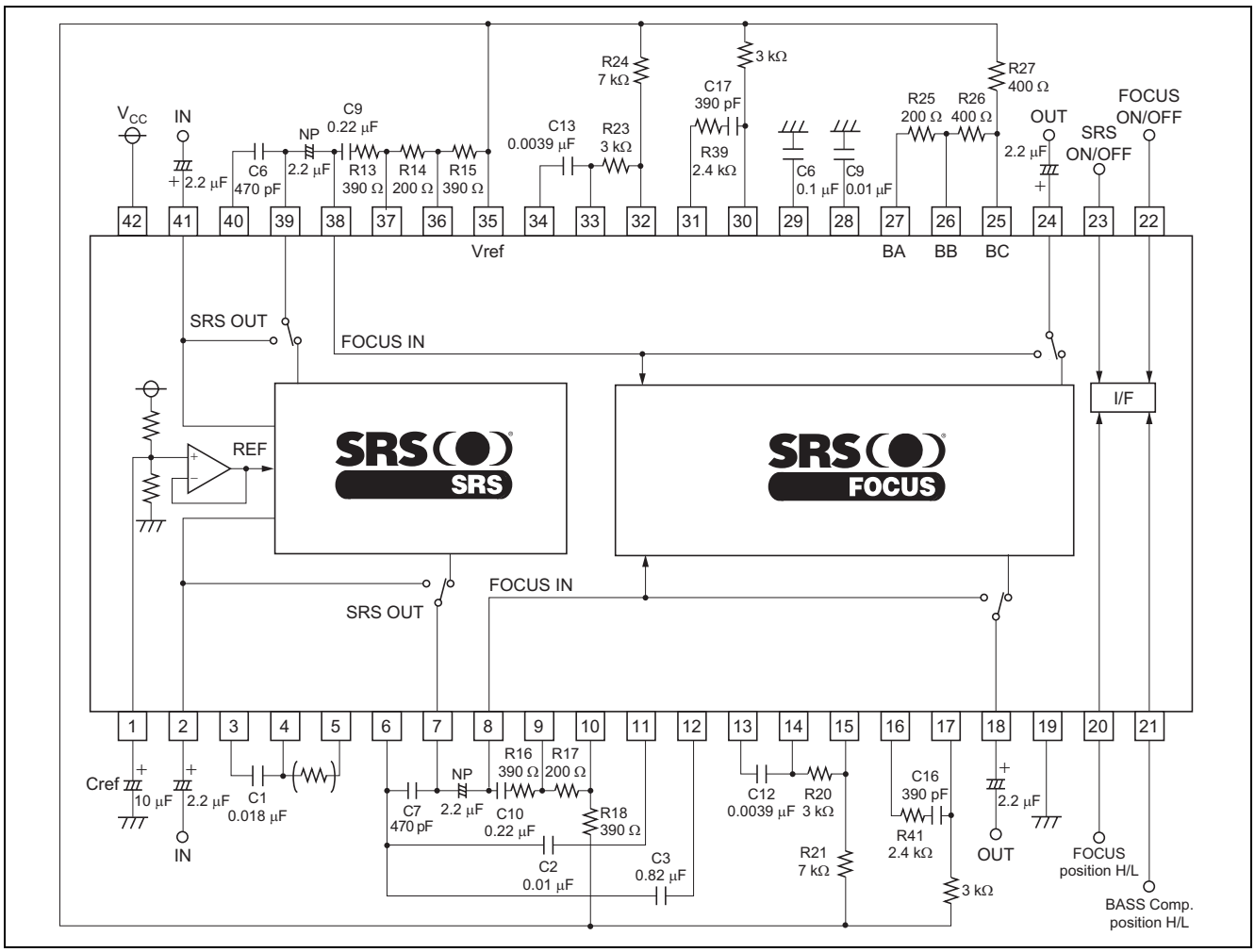
Switch Condition and the Mode

(23) SRS 3D Stereo	SRS ON/OFF Switch
SRS ON	H
SRS OFF	L

(22) FOCUS	FOCUS ON/OFF Switch
FOCUS ON	H
FOCUS OFF	L

Note: Bypass mode can be set by both SRS ON/OFF switch and FOCUS ON/OFF switch are set to “L”.

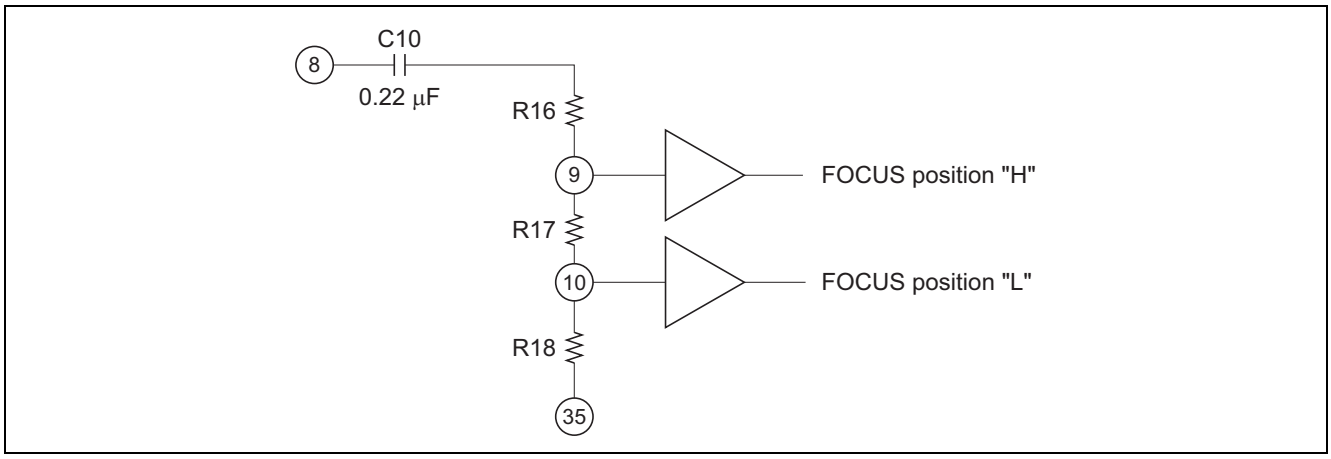
Application Circuit Example



Regarding to the other Application Circuit

- R16 (R13), R17 (R14), R18 (R15)
  The resisters of R16 (R13), R17 (R14), R18 (R15) can be set the FOCUS position (LF Elevation).

Note: This figure shows only the side channel.



1. The setting of the FOCUS position “H”

$$\frac{R17 + R18}{R16 + R17 + R18}$$

2. The setting of the FOCUS position “L”

$$\frac{R18}{R16 + R17 + R18}$$

Note: please keep the following formula.

$R16 + R17 + R18 \approx 1\ k\Omega$

(Example)

In the case of $R16 = 390\ \Omega$, $R17 = 200\ \Omega$, $R18 = 390\ \Omega$

FOCUS position “H” ≈ 60%

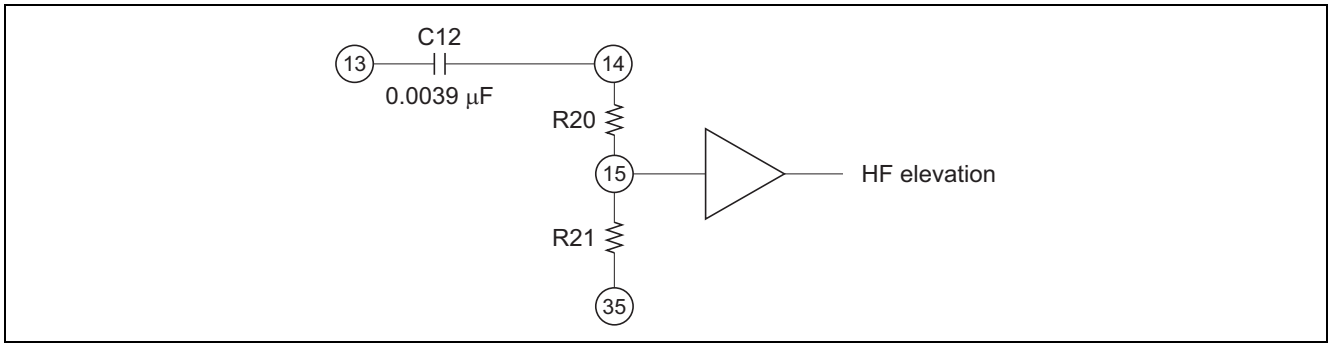
FOCUS position “L” ≈ 40%

(Switch Setting)

	FOCUS ON/OFF Switch (22 Pin)	**FOCUS Position H/L Switch (20 Pin)**
FOCUS Position “H” (LF Elevation)	H	H
FOCUS Position “L” (LF Elevation)	H	L

- R20 (R23) , R21 (R24)
  The resisters of R20 (R23), R21 (R24) can be set the HF Elevation.

Note: This figure shows only the side channel.



1. The setting of the HF Elevation.

$$\frac{R21}{R20 + R21}$$

Note: please keep the following formula.

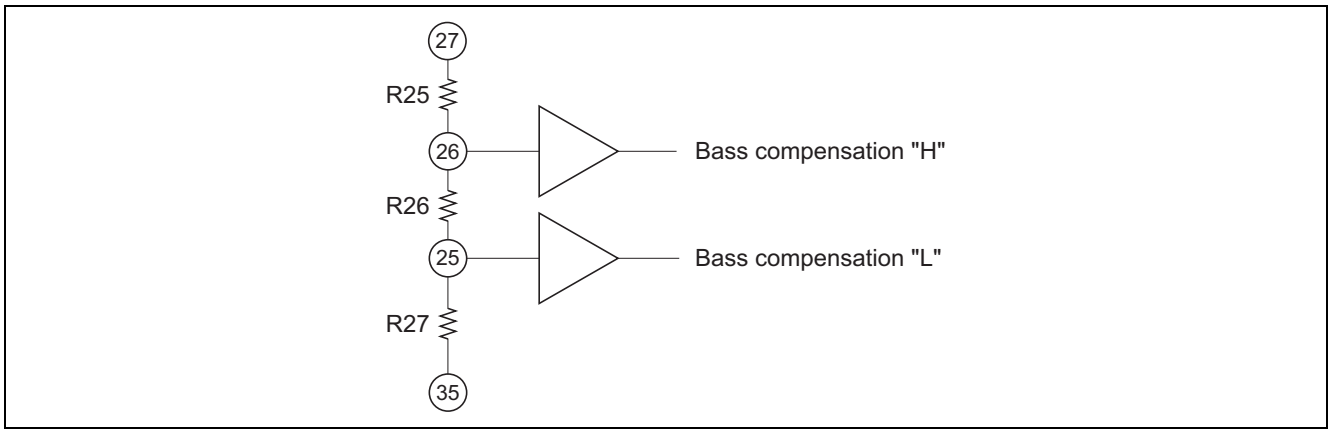
$R20 + R21 \approx 10\ k\Omega$

(Example)

In the case of $R20 = 3\ k\Omega$, $R21 = 7\ k\Omega$

HF Elevation ≈ 70%

- R25, R26, R27
  The resistors of R25, R26, R27 can be set the Bass Compensation.



1. The setting of the Bass Compensation “H”

$$\frac{R26 + R27}{R25 + R26 + R27}$$

2. The setting of the Bass Compensation “L”

$$\frac{R27}{R25 + R26 + R27}$$

Note: please keep the following formula.

$R25 + R26 + R27 \approx 1\ k\Omega$

(Example)

In the case of $R25 = 200\ \Omega$, $R26 = 390\ \Omega$, $R27 = 390\ \Omega$

Bass Compensation “H” ≈ 80%

Bass Compensation “L” ≈ 40%

(Switch Setting)

	FOCUS ON/OFF Switch (22 Pin)	Bass Comp. H/L Switch (21 Pin)
Bass Compensation “H”	H	H
Bass Compensation “L”	H	L

Between Pin16 (31) and Pin17 (30)

Add 10 k of resistors between Pin16(31) and Pin17(30), can adjust the difference between the sound level of Focus ON and the sound level of Focus OFF.

Also add 10 k of resistors between Pin16(31) and Pin17(30), can decrease the Focus gain.

Then the maximum input voltage and the output noise voltage can be improved.

(Reference)

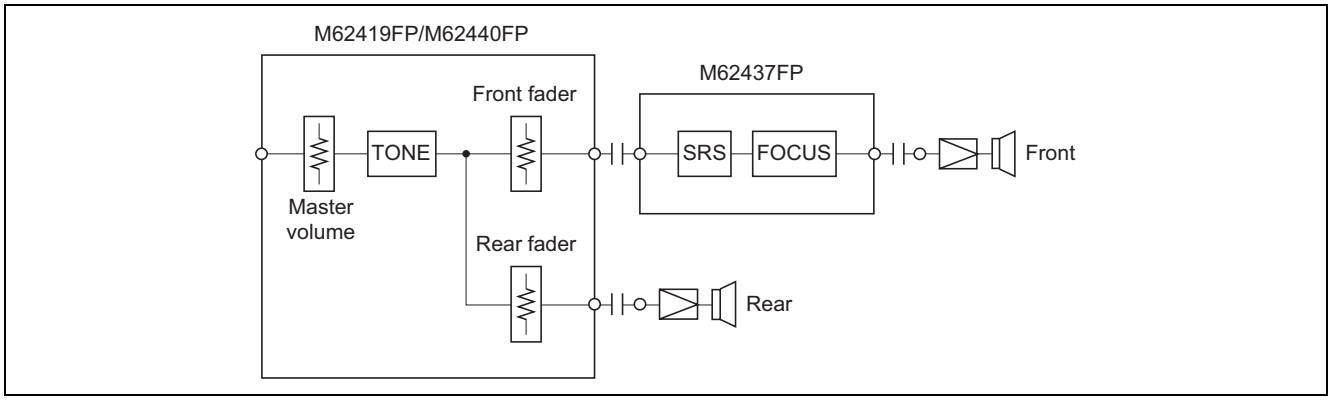
In the case of
(VOL.1, 2 = 1kΩ, VOL.3, 4 = 10kΩ, VOL.5 = 1kΩ, Add 10kΩ of resistors between Pin16(31) and Pin17(30))

Item	Symbol	Typ.	Unit	Conditions	
Maximum output voltage	VOMt	1.9	Vrms	Input; pin2, 41 Output; pin18, 24 RL = 10kΩ, THD = 1%	
Maximum input voltage	VIM1	0.6	Vrms	Input; pin2, 41/Output; pin18, 24 SRS→ON, FOCUS→OFF THD = 1%	f = 150Hz
	VIM2	0.55		Input; pin2, 41/Output; pin18, 24 SRS→ON FOCUS→ON (All VOL. = max) THD = 1%	f = 1kHz
	VIM3	0.2			f = 20kHz
Pass gain	Gvt	0	dB	Vi = 100mVrms SRS, Focus→OFF Input; pin2, 41/Output ; pin18, 24	
	Gv1	10		Vi=100mVrms Input; pin2, 41/Output ; pin18, 24 SRS→ON, FOCUS→OFF	f = 150Hz
	Gv2	12		Vi = 100mVrms SRS→ON FOCUS→ON (All VOL. = max) (2pin, 41pin)-(18, 24Pin)	f = 1kHz
	Gv3	22			f = 20kHz
Output noise voltage	Vno1	5.5	μVrms	Rg = 0 (2, 41pin) SRS→OFF, FOCUS→OFF DIN-AUDIO filter	
	Vno2	18		Rg = 0 (2, 41pin) SRS→ON, FOCUS→OFF DIN-AUDIO filter	
	Vno3	50		Rg = 0 (2, 41pin) SRS→ON, FOCUS→ON (All VOL. = max) DIN-AUDIO filter	
Channel separation	CT	–90	dB	Input Side: f = 1kHz, Vi = 0.5Vrms Monitor Side: Rg = 0, IHF-A filter Focus: OFF, SRS: OFF RL=10kΩ	

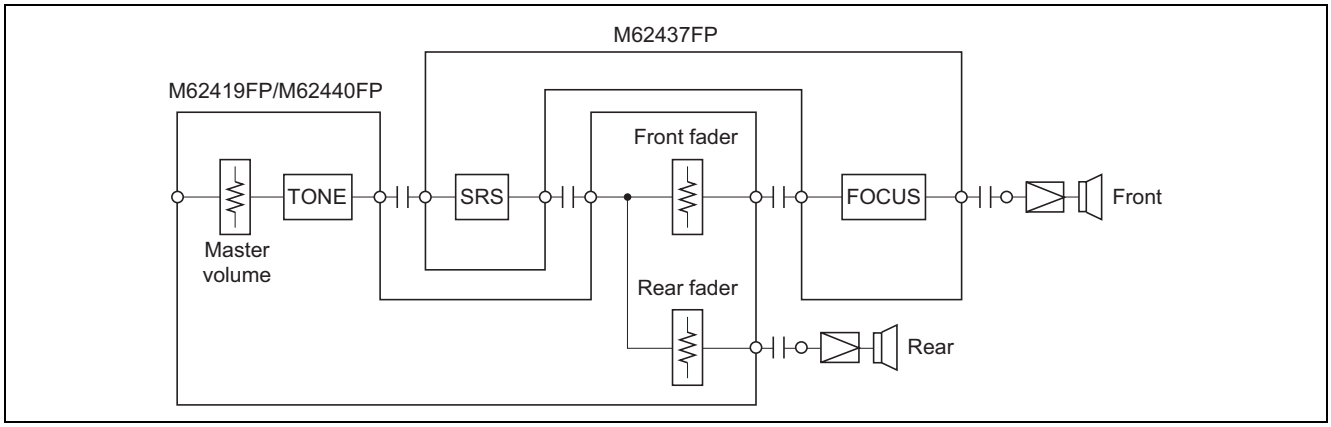
System Circuit Example

(The following figures show only the side channel.)

1. In the case of SRS 3D stereo is effective for the front speakers.



2. In the case of SRS 3D stereo is effective for the front and rear speakers.
   (FOCUS is effective for the front speakers.)



Note

Each switches (SRS ON/OFF, FOCUS ON/OFF and FOCUS Position H/L Switches) does not have the countermeasure for click noise, so that we recommended outside mute circuit.

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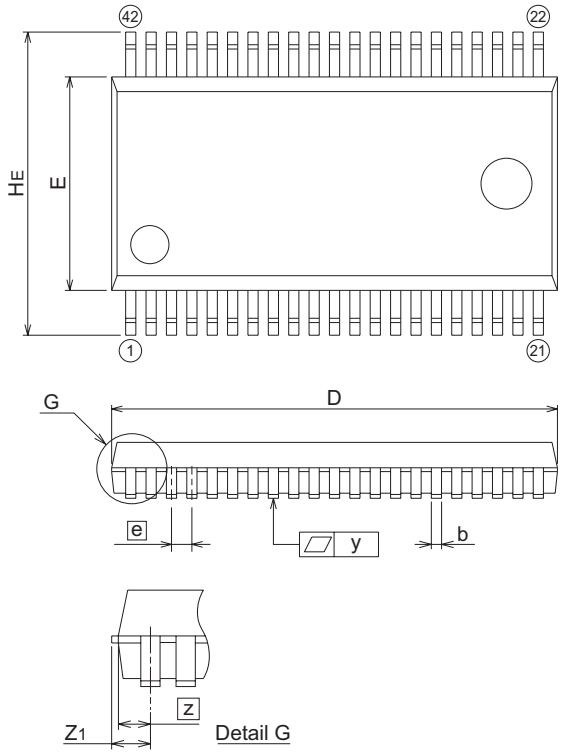
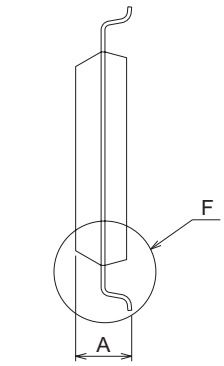
Package Dimensions

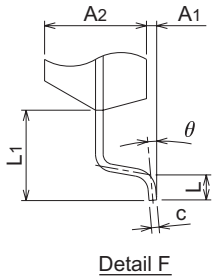
42P2R-A (MMP)

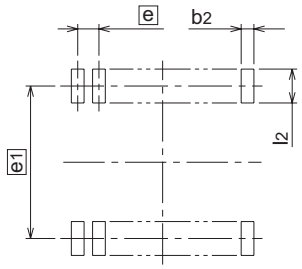
Plastic 42pin 450mil SSOP

EIAJ Package Code	JEDEC Code	Weight(g)	Lead Material
SSOP42-P-450-0.80	—	0.63	Alloy 42/Cu Alloy









Recommended Mount Pad

Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	—	—	2.4
A_1	0.05	—	—
A_2	—	2.0	—
b	0.35	0.4	0.5
c	0.13	0.15	0.2
D	17.3	17.5	17.7
E	8.2	8.4	8.6
e	—	0.8	—
H_E	11.63	11.93	12.23
L	0.3	0.5	0.7
L_1	—	1.765	—
z	—	0.75	—
Z_1	—	—	0.9
y	—	—	0.15
θ	0°	—	10°
b_2	—	0.5	—
e1	—	11.43	—
l_2	1.27	—	—

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